

Colorado Department of Health

Review and Comment

Technical Memorandum 1 - Revisions to Final Phase I
RFI/RI Workplan, December, 1991

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General Comments:

In our comments to the draft version of this document, both the Division and EPA requested that DOE remove references to a Phase II RFI/RI investigation. As only sections 2 and 7 have been resubmitted, we can only conclude that these comments were not addressed. We request again that these Phase II references be removed. Subsequent discussions have concluded that the only portion of OU 5 that will definitely require a Phase II investigation is the Old Landfill. As the following comments indicate, only portions of the document that address the Old Landfill should contain text describing a Phase II investigation.

Specific Comments:

Section 2.0: Although substantial improvements have been made to this section, no conceptual model diagram of the Old Landfill was included in this section. We believe this is nothing more than an oversight because a satisfactory diagram was distributed at the November 11, 1991 meeting discussing this subject. Please include an official version of this diagram in this document. (A copy of the diagram we received is attached.)

Section 7.2: Prior to the discussion of the investigatory stages, text should be included that explains how the Phase I and Phase II investigations will be implemented (ie., Phase I will define contaminant boundaries and assess the potential for contaminant migration - that is, establish if the landfill is leaking; Phase II will address source characterization - three-dimensional investigation of the landfill.). Please see EPA's November 29, 1991 letter outlining this concept.

Section 7.2.1: We are providing suggested re-written portions of the Stage 1, Stage 2, Stage 3, and Stage 4 sections to clarify or change several items of concern. We have also reorganized several activities into a Stage 5 and Stage 6. These are suggestions only

and are being provided to give guidance on what the Division would approve. The Division does not require that our wording be used in a final version of this document. We will insist, however, that the modified content be incorporated. The re-written sections of text coincide with a re-written Table 7-1 and proceed through the investigation in a chronological and prioritized fashion as indicated in the attached flowchart diagram for the Old Landfill (Figure A). The re-written sections follow; the Division's changes have been highlighted. After each suggested change, we have provided a rationale:

Stage 1 - Review Aerial Photographs and Radiation Survey

Rationale: The text of this section describes a review of the Radiation Survey and the Division feels this should be indicated in the section title. There are no further changes in this Stage.

Stage 2 - Magnetometer, EM, Soil Gas, Surficial Soil Samples, Soil Cores, and Soil Borings/Monitor Wells

Rationale: The title of this section was changed to more accurately describe the content and priorities of this stage.

A magnetometer survey will be performed . . .

Rationale: Since the soil gas survey is dependent on the magnetometer and EM surveys to locate anomalies which warrant tighter soil gas gridding, this paragraph was moved to the beginning of this stage. There are no text changes in this paragraph.

An EM geophysical survey will be performed over the Old Landfill on the same 25-foot grid established for the magnetometer survey and will cover the same area. The survey . . .

Rationale: This paragraph was moved for the same reason as the preceding paragraph. The indicated change clarifies further the area of the EM Survey coverage. There are no further text changes in this paragraph.

A real-time soil gas survey will be conducted over the Original Landfill and the disturbed area located to the east of the Landfill to identify areas of volatile organic contamination. As specified in the IAG, the soil gas samples will be taken on a 100-foot grid according to the procedures described in SOP GT.9. To further improve the sampling coverage, the grid will be reduced to 25-foot spacing at the perimeter of the landfill, over areas of suspected buried metallic materials based on the magnetometer and EM surveys, and over areas where volatiles are found during the 100-foot grid soil gas survey. The perimeter of the landfill will be defined by both the aerial photograph review and field

reconnaissance. The 25-foot soil gas grid spacing around the perimeter will cover at least the area between the last 100-foot grid location within the landfill area and the first 100-foot grid location outside the landfill area (see Figure 7-1). The 25-foot soil gas grid located over metallic materials or volatile plumes will continue for at least 50 feet beyond the edge of the anomaly. This approach . . .

Rationale: The original text failed to define how the 25-foot grid spacing for the soil gas survey would be implemented.

At least ten randomly located surficial soil samples will be collected to characterize the landfill cover material and exposed fill material using the ??? method. These samples will help establish whether the landfill is leaking via fugitive dust entrained in air. In addition, based on the review of the radionuclide survey, additional surficial soil samples will be collected within the areas that have above background radiation. At least two samples will be collected at small or point sources of radiation and at least three will be collected over distributed sources.

Rationale: Four random surficial soil samples would not be enough to characterize the entire landfill area with sufficient statistical confidence. In addition to characterizing the cover material, the surficial soil samples need to characterize the exposed fill materials. Moreover, the method of collection needs to be specified. We will not insist that it be the CDH method; the Division would rather see the best method employed for a given situation rather than insist on a method that DOE thinks is required. We emphasize, however, the need for data comparability with other OUs and IHSSs. If the CDH method is used, please use the protocol for collecting a "Single soil sample." If another method is used, we recommend the 10 sub-samples in a two square meter area recently proposed to be used in Tech Memo 5 for the Phase III RFI/RI Workplan for OU 1.

Further Rationale: A review of the radiation survey should have already been completed and locations for hot-spot soil samples already proposed. However, since this has not been done, further definition of the location and number of these hot-spot samples is needed in the text.

Soil cores will be collected on a random basis to verify the soil gas survey and other screening methods. One soil core will be collected for every 15 to 20 soil gas samples at the same depth as the soil gas samples. Based on the number of soil gas sampling locations, a minimum of ??? soil cores will be collected.

Rationale: Based on the addition of the 25-foot soil gas grid spacing addition, a new total of soil cores needs to be estimated.

Three soil borings will be placed at up to three areas where plumes have been identified by the soil gas survey . . .

Rationale: This section of the third paragraph in the "Stage 3" section has been moved to this location to better describe the chronological implementation of these borings. No text was changed in this paragraph.

Based on information from the soil gas survey, soil cores, and soil borings, monitoring wells will be installed in locations with the highest volatile readings. Since it is possible, due to the limited saturated thickness of the alluvium, that there may be locations where there is no water, it might be necessary to relocate wells or install vadose zone sampling devices such as BAT samplers. BAT samplers, or an equivalent, are able to characterize the contaminant plumes in zones of limited water. It may also be necessary to install bedrock monitoring wells beneath . . .

Rationale: The locations for monitoring wells will also be dependent on the results from the soil cores and soil borings. The BAT Sampler may not work in the alluvium at RFP. Therefore, the text should leave open the possibility that another type of sampler may be necessary.

Stage 3 - Soil Borings in the Ponds and Disturbed Area East of the Landfill

One soil boring will be drilled in the location of each of the former ponds. Six soil borings will be drilled in the disturbed area east of the Landfill. Each soil boring will be drilled at least . . .

Rationale: The title of this section has been changed to properly indicate the content of this Stage. The applicable paragraph, with no text changes, was moved to this section.

Stage 4 - Cone Penetrometer, BAT Sampler (or equivalent), and Monitor Wells

Rationale: The title of this section has been changed to properly indicate the content of this Stage.

A cone penetrometer (CP) will be used to establish certain subsurface conditions and lithologies downgradient from the landfill. One subsurface condition that is essential to characterize is soil moisture and/or saturation. A cone penetrometer with this capability will be used. Two lines of CP surveys will be taken with a maximum of 100-foot spacing between individual surveys; one line will be between the landfill and the SID, and one line will be between the SID and Woman Creek (see

Figure 7-1). In the appropriate CP survey locations (locations where significant soil moisture was located), BAT sampling (or an equivalent) will be used to sample any encountered ground water or interstitial fluid. These samples are necessary to help establish whether contaminated plumes are presently leaking from the landfill.

Rationale: The CP is not capable of gathering subsurface water or fluid samples and are very lithology dependent when determining the presence of moisture or saturation. To properly determine whether or not the landfill is leaking, actual samples are imperative. Also, proper calibration of the cone penetrometer is necessary. Therefore, to sample the fluids, the BAT sampler, or an equivalent, has been added. To calibrate the CP, the Division suggests that one or several of the soil borings already planned for this investigation be "twinning" so that the CP can penetrate known lithologies and saturations. In addition, the original text did not specify number or spacing for the cone penetrometer testing. This needs to be clarified.

In addition to the above wells, monitoring wells and/or vadose zone samplers will be installed in the alluvium downgradient of the Landfill. The location, type, and number of monitoring devices will be dependent on all other data gathered in this Phase I investigation.

Rationale: It is not appropriate, at this point in the investigation, to propose how many and what type of monitoring wells will be needed downgradient of the landfill. This is a perfect opportunity to use the much heralded "Observational Approach."

It may also be necessary to install bedrock monitoring wells beneath zones of contaminated alluvial groundwater or if subcropping Arapahoe sandstone is encountered. The need for bedrock wells will be evaluated after lithologic and preliminary contaminant data has been gathered and interpreted.

Rationale: This change was added for the same reason as the previous change.

The use and location of the proper type of monitoring devices should be able to ascertain both present and future contaminant levels and help establish any future or present contaminant migration problems. The locations for the monitoring devices should monitor the principle groundwater and downgradient migration pathways from the Old Landfill.

All groundwater monitoring wells will be drilled . . .

Stage 5 - Surface Water and Sediment Sampling

The sediments and surface water of the South Interceptor Ditch (SID) and Woman Creek will be sampled . . .

Rationale: These activities were placed in a separate stage so that they could be implemented separately and possibly sampled coincidentally with samples of other stages. For instance, these samples may need to be collected in the very near future due to the planned construction in the SID. There are no text changes to this paragraph.

Stage 6 - Outfall Pipe Location, Source, and Sampling

The two corrugated metal pipes protruding . . .

Rationale: These items were placed in a separate stage because they are unrelated to any other activity and could be implemented separately. There are no text changes to this paragraph.

Figure 7-1: Please update this figure to include the 25-foot grid spacing for the soil gas survey, the locations of the principle radiation hot-spots, the cone penetrometer/BAT sampler survey lines, and surficial soil samples.

Table 7-1: A revised version of this table is attached.

Section 7.2.2: This section should be re-formatted to present the FSP for the ash pits in chronological order, similar to what was presented for the Old Landfill previously in these comments. (Please see attached Figure B.)

At least one randomly located surficial soil sample needs to be collected from within each ash pit boundary.

The cone penetrometer is listed in the title of "Stage 2" but is never discussed in the text. Please add appropriate text.

Soil borings need to transect each area of anomalous radiation readings on 25-foot spacing continuing at least one boring beyond the edge of the anomaly. Two transects of borings will be run on each anomaly intersecting near the center of the affected area.

The appropriate location, number, and type of monitoring well will be selected following Stage 3 activities and after a review of the geologic characteristics of the site.

Table 7-2: A revised version of this table is attached.

Figure 7-3: All of the sampling in the surface disturbance south of the ash pits needs to be correctly indicated as soil borings.

Figure 7-4: All of the sampling in IHSS 209 needs to be correctly indicated as soil borings.

Table 7-7: This table needs to be revised to indicate the correct number of surficial soil samples. In addition, a line item needs to be added for BAT (or equivalent) samples to both the IHSS 115 and IHSS 133 listings.

FIGURE A

OLD LANDFILL (IHSS 115)

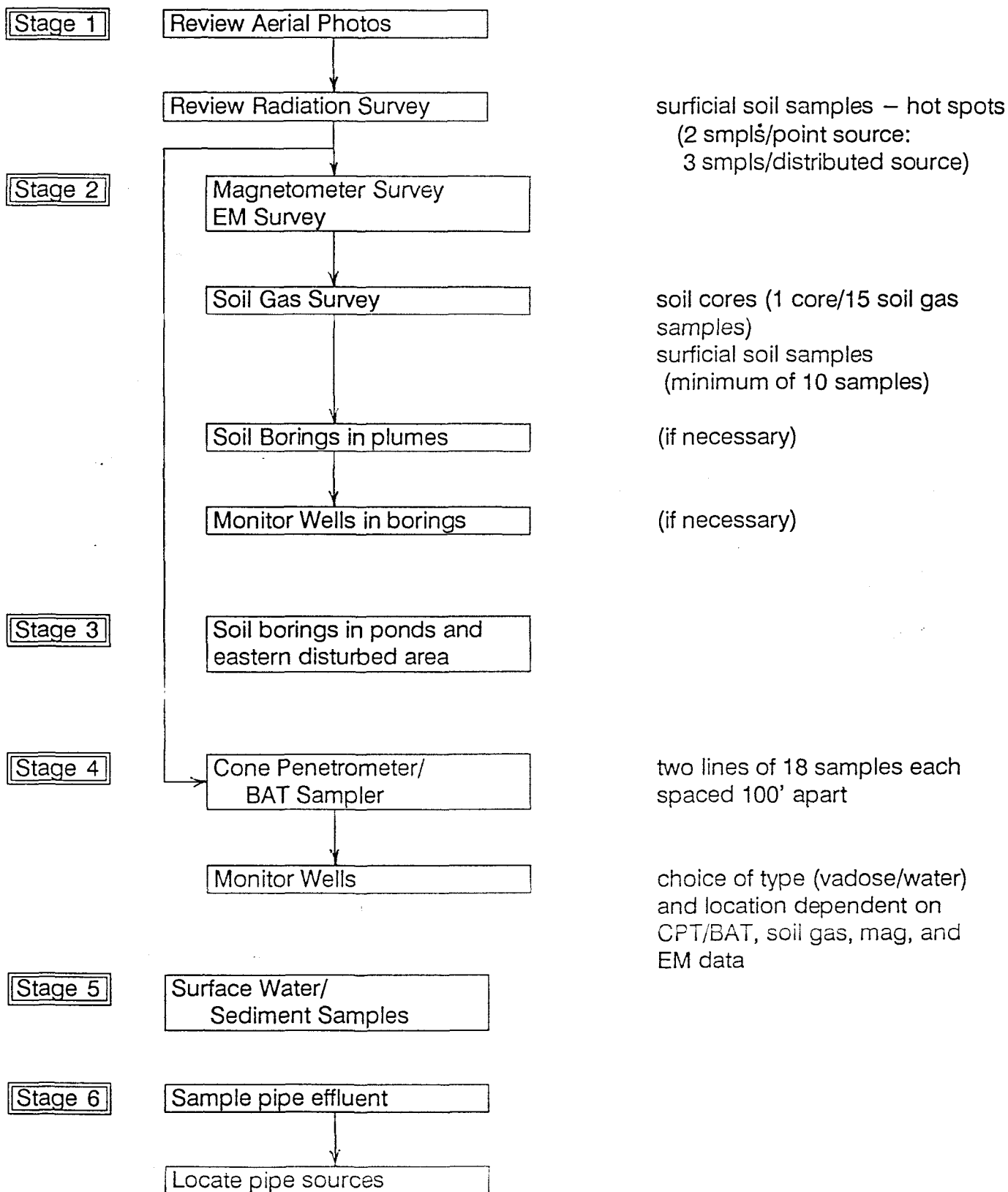


Table 7-1
Phase I Investigation
IHSS 115 - Original Landfill

Activity	Purpose	Location	Sample Number
1. Review Aerial Photographs	Identify extent of Landfill and disturbed area east of landfill	Landfill area and eastward	NA
2. Review Radiation Survey	Identify areas of anomalous radiation readings	Landfill area	NA
3. Magnetometer Survey	Locate ferrous objects	Entire landfill area - 25' grid	2490
4. EM Survey	Locate ferrous objects and help locate IHSS boundaries	Entire landfill area - 25' grid	2490
5. Soil Gas Survey	Locate plumes of volatile organics	Entire landfill area - 100' grid modified at perimeter to 25' grid	To be determined
6. Soil Cores	Verify soil gas readings	1 random sample/15 soil gas samples; taken at depth of soil gas probe	To be determined
7. Surficial Soil Samples	Characterize Rad survey hot-spots Characterize surface contamination	Within hot-spots Random basis thruout landfill	2 smpls/hot-spot minimum 10 samples
8. Soil Borings	Characterize subsurface conditions and contamination	1 boring/former pond 6 borings in disturbed area east of landfill	8
9. Soil borings (if plumes identified)	Transect and sample plumes identified by soil gas	3 borings transecting each plume 1 boring at highest VOA reading and 2 add'l borings continuing down gradient from the first	maximum of 9
10. Install Wells in borings (if plumes identified)	Monitor subsurface plumes	In borings at the points of highest readings	maximum of 3
11. Cone Penetrometer	Characterize certain subsurface conditions and lithologies	Two lines of penetrations down gradient of landfill	18 samples in each of two lines on 100' spacing
12. BAT Sampler	Characterize subsurface fluids or gases	Same locations as cone penetrometer	18 samples in each of two lines on 100' spacing
13. Install Wells and/or Vadose Zone Sampling Devices	Monitor subsurface conditions	To be decided based on collected data	minimum of 4
14. Review plant plans, conduct sewer snake survey	Confirm connections of two pipes daylighting in the landfill	Two pipes in landfill	NA
15. Sample pipe effluent	Characterize effluent	Pipe outfalls	2
16. Sample Sediment and Surface Water in SID and Woman Ck.	Characterize surface conditions down gradient of landfill	2 locations on the SID and 3 locations on Woman Ck. for sediment and surface water	4 sediment and 6 surface water

FIGURE B

ASH PITS (IHSS 133)

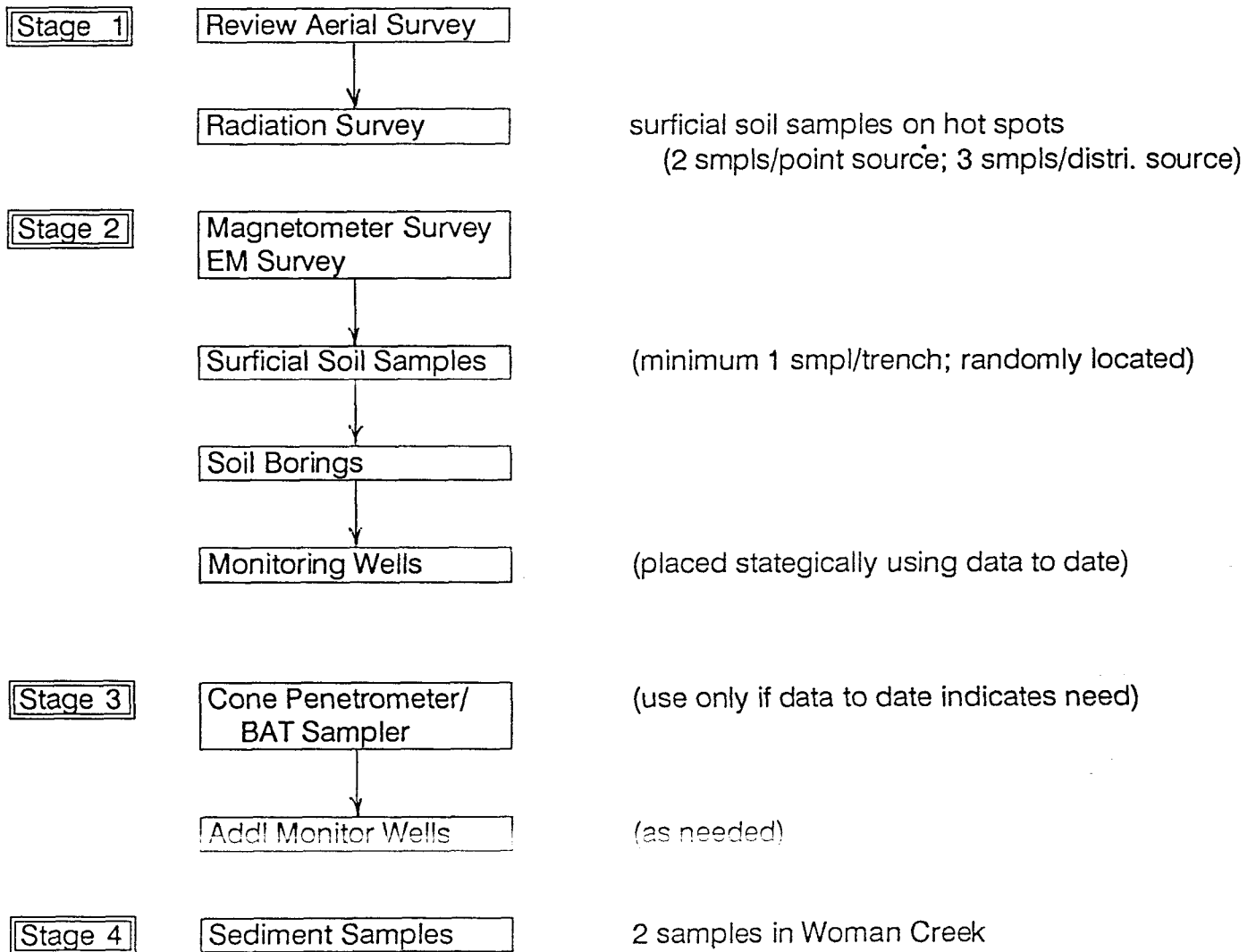


Table 7-2

Phase I Investigation
IHSS 133 - Ash pits and Incinerator

Activity	Purpose	Location	Sample Number
1. Review Aerial Photographs	Identify extent of ash pit areas, including areas beyond present IHSS boundaries	Entire ash pit area east to landfill	NA
2. Radiation Survey	Locate areas of anomalous radiation readings	All IHSS areas, areas between pits, and eastward to landfill	To be determined
3. Magnetometer Survey	Locate ferrous objects	All IHSS areas, areas between pits, and eastward to landfill	4864
4. EM Survey	Locate ferrous objects and help locate IHSS boundaries and plumes	All IHSS areas, areas between pits, and eastward to landfill	4864
5. Surficial Soil Samples	Characterize Rad survey hot-spots	Areas of above background radiation	To be determined
	Characterize surface contamination	randomly located within pit boundaries	At least 1 in each trench
6. Soil Borings	Characterize subsurface conditions and contamination	Down long axis and across short axis of each pit on 25' centers. Also within each radiation hot-spot.	Estimated minimum of 85.
7. Cone Penetrometer	Characterize certain subsurface conditions and lithologies	As needed to further characterize subsurface	To be determined
8. BAT Sampler	Characterize subsurface fluids or gases	As needed to further characterize subsurface	To be determined
9. Install Wells	Monitor subsurface conditions	To be decided based on collected data	To be determined
10. Sample Sediments in Woman Creek	Characterize surface conditions down gradient of ash pits	in Woman Creek	2